

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification 4 : B65D 43/14, 51/04, 55/02</p>	<p>A1</p>	<p>(11) International Publication Number: WO 89/ 08057</p> <p>(43) International Publication Date: 8 September 1989 (08.09.89)</p>
<p>(21) International Application Number: PCT/US89/00756</p> <p>(22) International Filing Date: 24 February 1989 (24.02.89)</p> <p>(31) Priority Application Numbers: 160,571 160,718 277,228</p> <p>(32) Priority Dates: 26 February 1988 (26.02.88) 26 February 1988 (26.02.88) 11 November 1988 (11.11.88)</p> <p>(33) Priority Country: US</p> <p>(71)(72) Applicant and Inventor: PEHR, Harold, T. [US/US]; 2930 W. 96th, Shawnee Mission, KS 66207 (US).</p> <p>(74) Agent: McMAHON, John, C.; Litman, McMahon & Brown, 922 Walnut, Suite 1215, Kansas City, MO 64106 (US).</p>		<p>(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent).</p> <p>Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(54) Title: HINGED CLOSURE FOR CONTAINERS</p>		
<p>(57) Abstract</p> <p>A container (1) includes a hinged closure member (4) having a latch (6) for securing the closure member in a closed position. The latch includes 'child resistant' configuration wherein it is very difficult for adolescents to open the container (1) and an 'easy open' configuration wherein it is relatively simple for persons with limited manual dexterity to open the closure member (4). The latch (6) includes a bipositional tongue (21) hinged to either the container or closure member. The tongue (21) is hinged to allow for the various configurations and, when in the child proof configuration, substantially requires use of both hands and a substantial amount of dexterity in order to open the closure member (4). Various devices are further provided to protect the tongue from manipulation by adolescents and for indicating previous tampering with the container. The closure member (4) is connected by a hinge to the container. The hinge includes a bar (53) attached to either the container (1) or the closure member (4) and a semi-circular sleeve (58) which rotates about the bar (53) and that is attached to the opposite of the container (1) or the closure member (4).</p>		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FR	France	ML	Mali
AU	Australia	GA	Gabon	MR	Mauritania
BB	Barbados	GB	United Kingdom	MW	Malawi
BE	Belgium	HU	Hungary	NL	Netherlands
BG	Bulgaria	IT	Italy	NO	Norway
BJ	Benin	JP	Japan	RO	Romania
BR	Brazil	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	LI	Liechtenstein	SN	Senegal
CH	Switzerland	LK	Sri Lanka	SU	Soviet Union
CM	Cameroon	LU	Luxembourg	TD	Chad
DE	Germany, Federal Republic of	MC	Monaco	TG	Togo
DK	Denmark	MG	Madagascar	US	United States of America
FI	Finland				

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

HINGED CLOSURE FOR CONTAINERS

Background of the Invention

The present invention relates to child resistant closures for containers having medicinals or other dangerous materials therein and, in particular, to such a container having a bipositional latch which allows adults of limited dexterity to easily open the container in one configuration and which provides a substantial amount of resistance to adolescents in opening the container when in the other configuration. Further, a hinge is provided which allows a closure member for the container to be molded separately from the remainder of the container, yet which prevents easy removal of the closure member from the hinge side when the closure member is closed. This allows a separately molded closure member to be easily mated with the container when the closure member is in an open position thereof.

For many years, both governmental and industry standards have been promulgated to attempt to prevent accidental poisoning or injury to children by making it relatively difficult for children to open certain types of containers, for example, pharmacy vials containing drugs. Unfortunately, most of the developments which make containers difficult to open by children also make the containers difficult to open by adults. This is especially true of adults having limited manual dexterity, such as both younger and older adults suffering from arthritis and other diseases or those having injuries which lessen the dexterity of the person.

1 Various prior art devices have been developed which
2 attempt to provide both a difficult to open container when
3 the product is being used in the presence of children and an
4 easy open container for persons having limited dexterity.
5 One such device of this type is described in applicant's
6 Patent No. 4,353,483 which included a bipositional hinged
7 tab which made the lid easy to open when in one position and
8 relatively difficult to open in another position.

9 Unfortunately, the prior art devices have had somewhat
10 mixed success with children, since children can be quite
11 creative in opening containers. This is especially true
12 where a child is willing to use his or her teeth to attempt
13 to open the lid of a container. The child is often able to
14 make up for the loss of manual dexterity or the inability to
15 understand how to open the lid through the strong pressure
16 that can be exerted by the teeth and which can pry the lid
17 open or bite off portions of the latch to allow the lid to
18 open. Certain prior art devices have attempted to
19 circumvent the problem of the child using the child's teeth
20 to open the latch by the positioning of guard members to
21 keep the child's teeth from engaging the lifting tab (for
22 example, see the U. S. patent to Stull No. 3,826,394).

23 None of the prior art devices has highly effectively
24 and inexpensively combined a structure which can be
25 configured so that it is easy opening for adults and yet
26 which can be configured so that it is very difficult to open
27 by children.

28 It is also becoming increasingly evident to product
29 safety specialists that closure members for certain types of
30 containers, especially pharmaceutical vials, should be

1 designed such that the lid once attached to the body is
2 always maintained connected to the body of the container and
3 preferably such that the lid can be closed using a single
4 hand. That is, that a user can both swing the lid into a
5 closed position while holding the vial with the same hand
6 that is being utilized to swing the lid and that the lid
7 will then automatically lock in a secured configuration when
8 the lid is closed. This concept is frequently referred to
9 as "one hand and one motion to close".

10 It is also desirable that the container include a hinge
11 for connecting the lid to the body of the container that is
12 also difficult for a child to manipulate and, thereby, open
13 the container from the rear thereof. There is also a need
14 in the industry for the lid to be able to be removed from
15 the container when in the open configuration thereof such
16 that the lid can be individually molded from the container.
17 This allows one standard size lid to be manufactured for
18 multiple sized containers or vials at a substantial savings
19 in molding expense.

20 It is still further desirable that such a hinge hold
21 the lid in at least one predetermined open position such
22 that the lid will not flop freely back into a closed
23 position, thereby making manipulation of the vial
24 difficult.

25 It is also desirable to be able to provide covers or
26 shields for both the latch and hinge to further prevent
27 tampering with these structures by children using their
28 teeth. In addition, the region between the container lid
29 and body other than at the latch and hinge is preferably
30 also protected from children prying apart the lid from the

1 body in this region.

2 Finally, it is desirable in some instances to be able
3 to provide a tamper indicating mechanism on the container
4 which indicates that the lid has been previously opened.
5 This is especially true of pharmaceuticals that are sold
6 over the counter in order to alleviate concerns that the
7 drugs therein have been poisoned.

8

9 Objects of the Invention

10

11 Therefore, the objects of the present invention are: to
12 provide a container having a closure member and a latch for
13 the closure member which is alternatively adjustable to an
14 easy opening configuration or to a child resistant
15 configuration; to provide such a latch that, when in the
16 child resistant configuration thereof, is relatively
17 inaccessible to a child's teeth; to provide such a latch
18 wherein the latch mechanism includes a bipositional and
19 resilient tang or tongue with an outward projecting tooth on
20 a distal end thereof and with an opposite end thereof
21 connected to either the container body or the closure member
22 and with the opposite of the container body or closure
23 member including a bar behind which the tooth flexibly
24 passes upon closing of the closure member such that the
25 tooth is resiliently biased to remain in such position until
26 manipulated by a person opening the container; to provide
27 such a latch wherein the person opening the latch must both
28 push radially against the resiliency of the tongue while
29 pulling upwardly on the closure member thereby requiring
30 simultaneous manipulation of at least three different fungei

1 to open the closure member; to provide such a latch wherein
2 the degree to resistance provided by the latch member to
3 opening is a function of the support provided directly
4 behind the tongue in conjunction with the flexibility of the
5 tongue; to provide such a container having a hinge thereon
6 which allows rotation of the closure member relative to the
7 container body when the closure member is in an open
8 position thereof; to provide such a hinge including a spaced
9 but generally tangentially extending bar-like structure on a
10 first of the closure member or container body and with a
11 semi-circular sleeve member on the opposite of the closure
12 member or container body such that the semi-circular member
13 rotates about the bar; to provide such a hinge wherein the
14 semi-circular member is aligned such that when the closure
15 member is in the closed position thereof, the semi-circular
16 member cannot be readily removed from the bar, whereas when
17 the closure member is in at least one open position thereof,
18 the semi-circular member can be removed from or placed on
19 the bar, thereby allowing the container to be manufactured
20 in two parts; to provide such a container having protective
21 shields passing over the latch member tongue and over the
22 hinge semi-circular member so as to limit accessibility of
23 children's teeth thereto; to provide such a container
24 wherein a seal is formed between the closure member and
25 container body between the hinge and latch and wherein the
26 seal is configured so as to prevent an adolescent from
27 prying the closure member apart from the container body in
28 this region; to provide such a container wherein the
29 container includes a tamper indicating mechanism to indicate
30 that the container has been previously entered; to provide

1 latch mechanism and a hinge mechanism which is readily
2 applicable to a wide variety of containers including
3 pharmacy vials, aerosol cans, blow molded bottles, bottles
4 with retainer rings and the like; and to provide such a
5 container which is relatively inexpensive to manufacture,
6 easy to use and particularly well adapted for the intended
7 usage thereof.

8 Other objects and advantages of this invention will
9 become apparent from the following description taken in
10 conjunction with the accompanying drawings wherein are set
11 forth, by way of illustration and example, certain
12 embodiments of this invention.

13 The drawings constitute a part of this specification
14 and include exemplary embodiments of the present invention
15 and illustrate various objects and features thereof.

16

17 Brief Description of the Drawings

18

19 Fig. 1 is a perspective view of a container having a
20 container body, a closure member, a latch, and a hinge
21 connecting the closure member to the container body.

22 Fig. 2 is a fragmentary perspective view of the
23 container, showing the latch in greater detail and the
24 closure member in a closed configuration thereof.

25 Fig. 3 is a top plan view of the container showing the
26 closure member thereof in an open configuration.

27 Fig. 4 is a cross-sectional view of the container
28 showing the closure member in an open configuration thereof
29 and showing the latch in an easy open configuration thereof,
30 taken along line 4-4 of Fig. 3.

1 Fig. 5 is a side elevational view of the container with
2 portions broken away to show detail thereof, with the
3 closure member in the closed configuration thereof and with
4 the latch in the easy open position thereof.

5 Fig. 6 is an enlarged and fragmentary top plan view of
6 the container showing the latch thereof.

7 Fig. 7 is an enlarged and fragmentary cross-sectional
8 view of the container showing the latch thereof, taken along
9 line 7-7 of Fig. 6.

10 Fig. 8 is an enlarged and fragmentary side elevational
11 view of the container showing the hinge thereof, with
12 portions broken away to show detail of the hinge.

13 Fig. 9 is a cross-sectional view of the container,
14 taken along line 9-9 of Fig. 5.

15 Fig. 10 is a top plan view of the container body of the
16 container with the closure member removed therefrom, showing
17 a portion of the hinge.

18 Fig. 11 is a fragmentary and enlarged bottom plan view
19 of the closure member of the container, showing a portion of
20 the hinge thereof.

21 Fig. 12 is an enlarged and fragmentary side and cross-
22 sectional elevational view of the container, showing a
23 portion of the hinge and taken along line 12-12 of Fig. 10.

24 Fig. 13 is an enlarged and fragmentary side and cross-
25 sectional elevational view of the closure member of the
26 container, showing a portion of the hinge and taken along
27 line 13-13 of Fig. 11.

28 Fig. 14 is an enlarged and fragmentary side elevational
29 view of the container showing the hinge in detail and
30 showing the closure member in an open configuration thereof.

1 Fig. 15 is an enlarged and fragmentary cross-sectional
2 side elevation view of the container, showing the hinge and
3 showing the closure member in a closed configuration
4 thereof.

5 Fig. 16 is a fragmentary and enlarged front elevational
6 view of the container showing the latch member in a child
7 resistant configuration thereof.

8 Fig. 17 is an enlarged and fragmentary front
9 elevational view of the container, showing the latch in an
10 easy open configuration and showing the closure member in a
11 closed configuration thereof.

12 Fig. 18 is an enlarged and fragmentary top plan view of
13 the container with the latch in the open configuration
14 thereof.

15 Fig. 19 is a fragmentary and enlarged cross-sectional
16 view of the container, showing the closure member in a first
17 open configuration thereof.

18 Fig. 20 is a fragmentary and enlarged cross-sectional
19 view of the container, showing the closure member in a
20 second open configuration thereof.

21 Fig. 21 is a fragmentary and enlarged cross-sectional
22 view of the container, showing the closure member in a third
23 open configuration thereof.

24 Fig. 22 is a fragmentary cross-sectional view of a
25 first modified container showing a closure in a first open
26 configuration thereof.

27 Fig. 23 is a fragmentary cross-sectional view of the
28 first modified container, showing the closure in a second
29 open configuration thereof.

30 Fig. 24 is a fragmentary cross-sectional view of the

1 first modified container, showing the closure in a third
2 open configuration thereof.

3 Fig. 25 is a fragmentary and exploded view of a second
4 modified container in accordance with the present invention
5 showing a container body, a closure member that is hingably
6 connected to the body and a latch member.

7 Fig. 26 is an enlarged and fragmentary cross-sectional
8 view of the second modified container showing the closure
9 member in a closed orientation thereof and showing the
10 closure member in an open orientation thereof in phantom
11 lines.

12 Fig. 27 is an enlarged and fragmentary cross-sectional
13 view of the second modified container, taken along line 27-
14 27 of Fig. 20.

15 Fig. 28 is a side elevational view of a third modified
16 container in accordance with the present invention,
17 including a container body, a hinged closure member and a
18 latch wherein lifting tabs offset from the latch are
19 provided on the closure member.

20 Fig. 29 is an enlarged and fragmentary top plan view of
21 the third modified container, showing the latch in an easy
22 open configuration thereof.

23 Fig. 30 is a fragmentary and enlarged front elevational
24 view of the third modified container, showing the closure
25 member thereof in a closed configuration and showing the
26 latch thereof in a child resistant configuration.

27 Fig. 31 is a fragmentary front elevational view of a
28 fourth modified container in accordance with the present
29 invention showing a container body, a closure member, a
30 latch and a tamper indicating device.

1 Fig. 32 is an enlarged and fragmentary side elevational
2 view of the fourth modified container with the latch thereof
3 in a child resistant configuration and with the tamper
4 indicating device in position, with portions broken away to
5 show detail thereof.

6

7 Detailed Description of the Invention

8

9 As required, detailed embodiments of the present
10 invention are disclosed herein; however, it is to be
11 understood that the disclosed embodiments are merely
12 exemplary of the invention, which may be embodied in
13 various forms. Therefore, specific structural and
14 functional details disclosed herein are not to be
15 interpreted as limiting, but merely as a basis for the
16 claims and as a representative basis for teaching one
17 skilled in the art to variously employ the present
18 invention in virtually any appropriately detailed
19 structure.

20 Figs. 1 through 21 illustrate a first container in
21 accordance with the present invention, generally designated
22 by the reference numeral 1. The container 1 includes a
23 container body 3, a closure member 4, a hinge mechanism 5
24 rotatably connecting the closure member 4 to the container
25 body 3 and a latch mechanism 6 for securing the closure
26 member 4 in a closed configuration to the container body 3.

27 The container body 3 of the illustrated embodiment is a
28 vial-like structure having a generally cylindrical side wall
29 10 and a bottom wall 11 secured to the side wall 10. The
30 side wall 10 is slightly tapered toward the bottom and

1 includes inwardly projecting beads 12 such that multiple
2 container bodies 3 with the closure members thereof in an
3 open position can be stacked together and such that the
4 beads 12 allow the stacked or nested container bodies 3 to
5 be removed from one another, as the beads 12 function to
6 prevent a vacuum from being formed between adjacent
7 container bodies 3.

8 Although a vial-like structure has been shown herein as
9 the container body 3, it is foreseen that the container body
10 could be many different structures such as a squeeze tube,
11 liquid dispensing bottles, including pour and squirt liquid
12 dispensers, aerosol cans, blow molded bottles and the like.
13 It is also foreseen under the present invention that the
14 container body could essentially be only an attachment ring
15 for mounting on a retention ring of a glass bottle, a
16 mechanical structure having a lid, such as a copy machine or
17 the like. In particular, it is foreseen that the present
18 invention can be utilized with a wide variety of devices
19 wherein it is advantageous to protect such a device from
20 being easily opened by children and yet wherein it is
21 desirable for adults of limited dexterity to be able to open
22 the device.

23 A first portion 15 of the latch mechanism 6 and a first
24 portion 16 of the hinge mechanism 5 are fixedly attached to
25 the container body 3. Likewise, a second portion 17 of the
26 latch mechanism 6 and a second portion 18 of the hinge
27 mechanism 5 are attached to the closure member 4.

28 The latch mechanism first portion 15 comprises a
29 radially outwardly projecting carrier 20 and a tang or
30 tongue 21 which is connected to the carrier at the lower end

1 thereof by a hinge 22. As used herein, the terms "upper",
2 "lower", "front", "back" and the like refer to the direction
3 provided in the description of the drawings and, in
4 particular, "front" is to the left in Fig. 4. The distal
5 part of the tongue 21 is thicker or wider than the attached
6 part thereof. The distal half of the tongue 21 includes a
7 rectangularly shaped recess 24. The recess 24 opens
8 radially outward when the latch mechanism 6 is in a hard to
9 open configuration thereof, such as seen in Fig. 7.

10 The tongue 21 also has a back surface 26 which is
11 opposite the recess 24 and which is generally planar. The
12 carrier 20 includes a mating surface 27 which partly abuts
13 against the tongue back surface 26 when the tongue 21 is in
14 the hard to open configuration thereof. The mating surface
15 27 extends from near the tongue hinge 22 to near the lower
16 edge of the recess 24. As will be discussed later, the
17 extension of the mating surface 27 is important in
18 determining how easy or how hard the latch mechanism 6 is to
19 open. It is noted that unless the hinge 22 is designed to
20 have limited flexibility, the position of the hinge 32 must
21 be below the top of the mating surface 27 such that the
22 tongue 21 will abut against the surface 27 at full extension
23 of the hinge 22 and provide a backstop for the lower part of
24 the tongue 21, while the tongue upper or distal end 29 is
25 being biased backwards.

26 On the most outward side of the recess 24 is a
27 relatively small elongate channel 28. Also extending from
28 near the recess 24 to near the distal end 29 of the tongue
29 is a slanted cam surface 30. It is noted that the tongue 21
30 has an easy open configuration which is illustrated in Fig.

1 5 wherein the tongue 21 is rotated on the hinge 22 such that
2 the back surface 26 does not engage the mating surface 27.

3 The tongue 21 is constructed of a relatively resilient
4 but bendable material if sufficient force is applied
5 thereto. The tongue 21, when in the hard to open
6 configuration thereof, is bendable at the upper end thereof
7 about an upper edge 32 of the mating surface 27.

8 There is a radius or curved surface extending back from
9 the upper edge 32 about which the tongue 21 bends. The
10 degree of the radius and the placement of the edge 32
11 relative to the recess 24 also regulate the degree of
12 difficulty in opening the latch mechanism 6 when in the hard
13 to open configuration. In particular, as the edge 32 is
14 raised and as the degree of radius is lessened, the latch
15 mechanism 6 becomes harder to open because it is harder than
16 to bend the tongue distal end 29 rearward so as to clear the
17 latch mechanism second portion 17 and allow the closure
18 member 4 to be opened.

19 The lower side of the recess 24 has associated
20 therewith a bar-like structure 31 that extends across the
21 front of the tongue. The structure 31 functions as a lower
22 projection and further limits the ease of opening of the
23 latch mechanism 6. In particular, the structure 31 prevents
24 a user from simultaneously pushing inward on the tongue 21
25 and upward on the latch mechanism second portion 17. It is
26 foreseen that the structure 31 may be not included if it is
27 desirable to have an easy open latch of this type, such as
28 on a lunch box.

29 As seen in Fig. 7, the upper end of the tongue 21 is
30 bendable or rotatable to the right with the edge 32 acting

1 as a fulcrum for such bending. The mating surface 27
2 cooperatively prevents a user from depressing the tongue 21
3 from beneath the recess 24 such that the user must push
4 against the tongue 21 above the recess 24. As will be noted
5 below, this requires at least two manual operations to be
6 applied to open the container 1 in addition to requiring the
7 container 1 to be held, since a user cannot push upward on
8 the closure member 4 with the same finger or thumb being
9 used to depress the tongue 4.

10 The latch mechanism second portion 17 is fixedly
11 secured to the closure member 4 and extends radially outward
12 therefrom. The closure member 4 of the illustrated
13 embodiment comprises a cap or lid 33 having a
14 circumferential side wall 34 and a top 35. A bottom edge 36
15 of the wall 34 seats in a corresponding recess 38 in the top
16 of the container body 3. The recess 38 has an outer wall or
17 ridge 39 that extends somewhat above the bottom of the
18 closure member 4 when in the closed configuration thereof so
19 as to prevent a child from placing his or her teeth under
20 the closure member 4 and prying it upward. This feature
21 could also be provided by providing a reverse draft or a
22 bead and groove mating between the surface of the container
23 body 3 and closure member 4.

24 The latch mechanism second portion 17 comprises a
25 wedge or tetrahedral-shaped projection 40 extending
26 outwardly from the closure member 4. The projection 40 has
27 an aperture 41 extending from top to bottom therethrough
28 (when in the closed position) and defining an opening for
29 receiving the tongue 21. A bar 43 forms the radially
30 outermost side of the aperture 41 and extends between

1 opposite triangularly shaped sections 44 and 45 of the
2 projection 40.

3 The aperture 41 is sufficiently wide to receive the
4 distal end of the tongue 21. In particular, when the
5 closure member 4 is closed, the cam surface 30 of the tongue
6 21 defining a tooth-like structure
7 engages the lower side of the bar 43, thereby pushing the
8 distal end of the tongue 21 inwardly and bending same
9 backwards over the mating surface 27 until the recess 24
10 clears the bar 43. At this time, the distal end of the
11 tongue 21 resiliently springs forward and the recess 24
12 snugly receives the bar 43 which is essentially shaped
13 identical to the recess 24. The bar 43 thereafter
14 interferingly restricts removal of the tongue 21 from the
15 aperture 41 and, in particular, prevents the tongue distal
16 end 29 from passing through the aperture 41 unless the
17 tongue 21 is bent substantially rearward.

18 In the present embodiment, the bar 43 includes a
19 radially outward projecting bead 47 which extends past the
20 tongue 21 and recess 24 thereof. Also in the present
21 embodiment, the bead 47 provides a fingerhold for a user to
22 urge the closure member 4 upwardly when the opposite hand of
23 the user is being utilized to push the upper end of the
24 tongue 21 backwardly so that the bar 43 is free to clear the
25 recess 24. In this manner, the closure member 4 can be
26 opened.

27 The bar 43 also has a centrally located and upwardly
28 projecting hemisphere or bump 49 thereon which is positioned
29 so as to interferingly mate with the channel 28 of the
30 tongue 21 when the tongue 21 is in the hard to close

1 configuration thereof and when the closure member 4 is in
2 the closed position thereof, such as is shown in Fig. 7 so
3 as to further interfere with opening of the latch mechanism
4 6 when in the hard to open configuration thereof.
5 Consequently, the degree of difficulty in opening the latch
6 mechanism 6 depends on many features including the placement
7 of the edge 32, the radius at the top of the surface 27, the
8 flexibility of the tongue 21, the size and placement of the
9 bar-like structure 31 and the interference between the
10 channel 28 and bump 49.

11 It is noted that, although the hinge mechanism first
12 and second portions 16 and 18 and the latch mechanism first
13 and second portions 15 and 17 are shown on the container
14 body 3 and closure member 4 respectively, it is foreseen
15 that their positions could be reversed.

16 The hinge mechanism first portion 16 includes a pair of
17 triangularly shaped and outwardly projecting stubs 51 and 52
18 joined by a bar 53. In the present embodiment, the bar 53
19 has a circular cross-section and is continuous between the
20 stubs 51 and 52. However, it is foreseen that the bar could
21 have other cross-sections including bumps, slots or the like
22 or that the bar could be formed by discontinuous and spaced
23 sections such as nipples extending outwardly from the stubs
24 51 and 52. The bar 53 is positioned close to the top of the
25 container body 3 and is spaced from the container side wall
26 10 and aligned such that, if the bar 53 were next to the
27 container side wall 10 that same would be tangential
28 thereto. A stub wall 55 projects outwardly from the side
29 wall 10 toward the bar 53 and in conjunction with the bar 53
30 and facing sides of the stubs 51 and 52 define an aperture

1 56 therebetween. The aperture 56 is sized so as to
2 relatively snugly receive a mating portion of the hinge
3 mechanism 6 as will be discussed below.

4 The hinge member second portion 18 can best be seen in
5 Figs. 11 and 13. The hinge member second portion 18
6 comprises a semi-circular sleeve 58 sized and shaped to be
7 received on and rotate about the bar 53. The sleeve 58 is
8 preferably resilient and has an inner diameter slightly
9 smaller than that of the bar 53 such that the sleeve 58
10 tightly grips the bar 53.

11 The sleeve 58 is supported by a depending wall 59
12 extending outwardly and downwardly from the rear of the
13 closure member 4. Extending outwardly from the closure
14 member 4 on either side of the depending wall 59 are also a
15 pair of struts 60 and 61 from which also depend a pair of
16 ears 62 and 63 on the inner sides thereof. Between the
17 depending wall 59, the semi-circular sleeve 58 and the ears
18 63 is defined a centrally located and circular channel 64
19 sized to be received about the bar 53. A pair of apertures
20 65 on either side of the sleeve 58 are positioned so as to
21 allow the sleeve 58 to be positioned over the bar 53.

22 In particular, the sleeve 58 is somewhat resilient and
23 the apertures 65 are readily biased to a more open position
24 during assembly of this structure such that the bar 53 is
25 forced between the apertures 65 and into the channel 64. It
26 is noted that the configuration and geometry of the
27 structure is such that the bar 53 may be placed in or taken
28 from the channel 64 only when the closure member 4 is in an
29 open configuration thereof. When the closure member 4 is in
30 the closed configuration thereof, the stub wall 55 prevents

1 the sleeve 58 moving in such a manner as to allow the bar 53
2 from becoming unengaged from the channel 64, thus
3 effectively preventing any disassembly of the container 1 by
4 manipulation of the hinge mechanism 5 when the closure
5 member 4 is in a closed configuration thereof.

6 Shown in Figs. 19 through 21 are various views of the
7 closure member 4 in different states of opening. It is
8 noted that the position of the stubs 51 and 52 is such that
9 the outer and upper edges 66 thereof are positioned so as to
10 selectively engage the struts 60 and 61 respectively of the
11 hinge mechanism second portion 18, as can be seen in Fig.
12 21 (when the closure member 4 is in an open configuration
13 thereof and at a preselected angle relative to the container
14 body 3).

15 In particular, the edges 66 engage the struts 60 and 61
16 in such a manner that it requires exertion of a small degree
17 of force on the top of the closure member 4 in order to
18 close the closure member 4 past the position shown in Fig.
19 21. In this manner, the closure member 4 is held open until
20 the user desires to close it at which time the user, while
21 holding the container 1 in one hand, may use a finger of
22 that hand to push downwardly on the closure member 4 thus
23 pushing the edge 66 past the struts 60 and 61 for a "snap-
24 like" closure. It is noted that this operation requires
25 only the use of a single hand, yet the closure member 4 has
26 at least one stable open position, as is seen in Fig. 21,
27 wherein the closure member 4 will retain such position until
28 urged therefrom by a user.

29 Shown in Figs. 22 through 24 is a first modified
30 container 70 that is quite similar to the previous

1 embodiment except in the design of the hinge mechanism 71
2 thereof. In particular, the modified container 70 includes
3 a container body 73 and a closure member 74 connected by the
4 hinge mechanism 71. The hinge mechanism 71 is in some ways
5 similar to the hinge mechanism 5 of the previous embodiment
6 except that a hexagonal shaped bar 76 extends between
7 supporting struts 77 that extend from the container body 73.
8 Likewise, the closure member 74 includes a depending wall 79
9 with a semi-circular sleeve 80. The interior surface 81 of
10 the sleeve 80 is also hexagonal in shape and similar in size
11 and configuration to the bar 76 so as to be snugly received
12 thereabout. The sleeve 80 is sufficiently resilient so as
13 to be rotatable about the bar 76 when pressure is applied to
14 the closure member 74, but when the projections of the bar
15 76 align with the valleys of the sleeve 80, the sleeve 80
16 tends to hold that position and, therefore, keep the closure
17 member 74 in such a fixed position until such time as
18 pressure is applied again to the closure member 74 by a user
19 to overcome the resistance to turning thereby provided.

20 Illustrated in Figs. 25, 26 and 27 is a second modified
21 embodiment of the present invention comprising a container
22 generally designated by the reference numeral 86. The
23 container 86 includes a container body 87 having an upper
24 wall 88 with an aperture 89 therethrough. A closure member
25 91 is interconnected to the upper wall 88 by a hinge 92. A
26 latch mechanism 94 is utilized to secure the closure member
27 91 in a closed configuration.

28 The hinge 92 of the container 86 comprises a flexible
29 strip 96 attached to the closure member 91 and having a pair
30 of large headed struts 97 extending therefrom. The struts

1 97 are positioned so as to fit into mating apertures 98
2 along the upper wall 88 and to lock therein.

3 The latch mechanism 94 includes a resilient member 100
4 mounted on the upper surface of the upper wall 88 and
5 extending outwardly therefrom. The resilient member 100
6 includes a tooth 101 extending outwardly therefrom.
7 Positioned behind the member 100 is a stub wall 102 with an
8 upper outer radius forcing the member 100. The wall 102 is
9 shaped and positioned such that the member 100 must be
10 braced to bend back over the wall 102 in order for the tooth
11 101 to clear the front of a tab 103. In particular, the
12 closure member 91 includes the rectangular tab 103 extending
13 outwardly therefrom so as to be positioned over the
14 resilient member 100 when the closure member 91 is in a
15 closed position thereof. The tab 103 includes an aperture
16 104 defining a bar 105 at the outermost side thereof. When
17 in the closed position of the closure member 91, the
18 resilient member 100 is positioned so that the tooth 101 is
19 positioned over the bar 105. In order to open the closure
20 member 91, the resilient member 100 must be biased backward
21 against an edge 106 of the wall 102 so that the tooth 101
22 clears the bar 105 while simultaneously pulling upward on
23 the closure member 91.

24 Shown in Figs. 28 through 30 is a third modified
25 embodiment of a container according to the present invention
26 and generally designated by the reference numeral 112. The
27 container 112 includes a container body 113 and a lid or
28 closure member 114. The container 112 is similar in many
29 respects to the container 1 of a previously described
30 embodiment. Therefore, the major differences between the

1 embodiments will be described in detail rather than
2 repeating many of the common details therebetween.

3 In particular, the container 112 includes a latch
4 mechanism 116 and a hinge mechanism 117. The latch
5 mechanism 116 includes a rotatable tongue or latch member
6 118 having an easy open position as shown in Fig. 27 and a
7 hard to open position as shown in Fig. 29. The latch member
8 118, when in the hard to open position thereof, has a recess
9 119 which engages a bar 120 mounted upon the closure member
10 114, as described in the previously described embodiment.

11 Of significant difference between this embodiment and
12 the first embodiment is that the closure member includes a
13 shield 122 extending radially outward from near a top
14 thereof so as to be spaced from but cover the bar 120 and
15 the latch member 118 when the latch member 118 is in the
16 hard to open position thereof. The shield 122 functions to
17 prevent children from using their teeth to bite off the top
18 of the latch member 118 and thereby adds an extra degree of
19 child resistance to the container 112. The latch mechanism
20 116 of the present embodiment also differs from the previous
21 embodiment in that the bar 120 is effectively flush with the
22 most radially exterior surface of the latch member 118 when
23 the latch member 118 is in the hard to open position
24 thereof. Effectively, this means that the bar 120 is not
25 accessible to a user to pry the closure member 114 upwardly
26 when the latch member 118 is pushed back sufficiently far
27 for the recess 119 to clear the bar 120. Consequently,
28 shoulders or ears 124 and 125 are provided on the closure
29 member 114 that allow gripping by the user for prying the
30 closure member 114 upwardly when the latch member 118 is

1 released from the bar 120.

2 A further modification of the present embodiment over
3 the first embodiment is in the hinge mechanism 117. The
4 hinge mechanism 117 of the present embodiment is otherwise
5 similar to the hinge mechanism of the first embodiment
6 except that a shield 127 is provided to extend over the
7 rearward portion of the hinge mechanism 117. The shield 127
8 provides a smooth exterior surface to a child trying to use
9 their teeth to damage the hinge mechanism 117 and thereby
10 open the container 112. This provides a further degree of
11 child resistance to the container 112.

12 Figs. 31 and 32 illustrate a fourth modified container
13 of the present invention generally designated by the
14 reference numeral 130. The container 130 includes a body
15 131 and a closure member 132 which are connected together by
16 latch mechanism 133. The container 130 is quite similar to
17 the container 1 of the first embodiment described except
18 that tamper indicating means such as tamper guard 134 is
19 provided.

20 In particular, the latch mechanism includes a resilient
21 member 135 having an upper tooth 136 which is swingable
22 between easy open and easy to close positions once the
23 container 130 is initially open. The closure member 132 has
24 an outwardly extending bar 137 which is manually received by
25 a recess 138 of the resilient member 135. The tamper guard
26 134 is an enclosure which is shaped to fit about the distal
27 portion of the resilient member 135 and, in particular, the
28 tooth 136. The tamper guard 134 is frangibly connected to
29 the closure member 132 such that it may be removed by a user
30 prior to use of the container 130. Prior to removal of the

1 tamper guard 134, the container 130 cannot be opened as the
2 tamper guard 134 interferes with the user's ability to push
3 the tooth 136 backwardly so as to clear the bar 137. Once
4 the tamper guard 134 is broken away, the tooth 136 can be
5 pushed by a user so as to clear the bar 137 at which time
6 the closure member 132 can be raised. It is noted that the
7 operation of pushing the resilient member 135 and raising
8 the closure member 132 must be accomplished simultaneously
9 and normally requires the use of both hands.

10 It is to be understood that while certain forms of the
11 present invention have been illustrated and described
12 herein, it is not to be limited to the specific forms or
13 arrangement of parts described and shown.

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

C L A I M S

What is claimed and desired to be secured by Letters Patent is as follows:

1. In a latch mechanism for securing a closure member to a container body including a multipositional latch hinged to a first of the closure member or the container body and allowing a user to select between a hard to open configuration and an easy to open configuration, the improvement comprising wherein:
 - (a) said latch is an elongate tongue hinged at one end thereof to the first of the closure member or the container body and having a rear surface and further having a tooth extending outwardly opposite said rear surface from near a distal end thereof;
 - (b) the first of the closure member or the container body also having positioned thereon a mating surface that abuts against said backing surface when said latch is in the hard to open configuration thereof; said mating surface having an upper edge whereabout said tongue is bent during opening of said latch mechanism; and

SUBSTITUTE SHEET

- (c) the second of the closure member or the container body having extending therefrom a bar; said bar being positioned such that, when said latch is in the hard to open configuration thereof, said tooth is resiliently biased over said bar and said mating surface is aligned to abut against said back surface in close proximity to said bar, such that a user, to open the latch, must manually bias the distal end of said latch to bend the latch at the upper edge of the mating surface such that said tooth clears said bar while simultaneously lifting said closure member.

SUBSTITUTE SHEET

2. A latch mechanism for securing a closure member to a container body including:
- (a) a latch adapted to be connected to a first of the closure member or the container body and having a closed position and an open position relative to the closure member;
 - (b) said latch comprises an elongate tongue connected near one end thereof to the first of the closure member or the container body and having a rear surface and further having a tooth extending outwardly opposite said rear surface from near a distal end thereof;
 - (c) a bar adapted to be attached to the second of the closure member or the container body and being positioned such that, when said latch is in the closed configuration thereof, said tooth holds said bar and is adapted to prevent the closure member from being opened relative to the container body until said tooth is biased rearwardly relative to said bar and the closure member is simultaneously biased to an open position relative to the container body to urge said bar past said tooth such that said tooth must be biased rearwardly and the closure member simultaneously biased open relative to the container body in order to move from said latch closed position to said latch open position;

SUBSTITUTE SHEET

- (d) and further wherein said latch includes means thereon and said bar is configured relative to said latch such that said tooth cannot be depressed rearward and said bar moved from the closed position to the open position simultaneously by use of a single finger; and
- (e) a projection adapted to extend outwardly from the second of the closure member or the container body in substantial circumferentially spaced relationship to said bar; said projection extending sufficiently outward to allow a user to grasp thereunder with a finger, so as to open the closure member relative to said container body when a different finger is depressing said latch tooth rearwardly, whereby at least two fingers are required to be simultaneously used with some dexterity in order to open said latch mechanism.

SUBSTITUTE SHEET

3. The latch mechanism according to Claim 2 wherein:
- (a) said latch includes structure means spaced from said tooth and projecting in the same direction as said tooth; said structure means and said tooth relatively snugly receiving said bar therebetween when said latch is in said closed position thereof; said structure means being generally flush with a front of said bar when said latch is in the closed position thereof so as to provide a user no place to grasp said bar opposite said tooth and thereby inhibit a user from using said bar to open the closure member relative to said container body.

SUBSTITUTE SHEET

4. In a latch mechanism for securing a closure member to a container body including a multipositional latch hinged to a first of the closure member or the container body and allowing a user to select between a hard to open configuration and an easy to open configuration, the improvement comprising wherein:

- (a) said latch is an elongate tongue hinged at one end thereof to the first of the closure member or the container body and having a rear surface and further having a tooth extending outwardly opposite said rear surface from near a distal end thereof;
- (b) the first of the closure member or the container body also having positioned thereon a mating surface that abuts against said rear surface when said latch is in the hard to open configuration thereof; said mating surface having an upper edge whereabout said tongue is bent during opening of said latch mechanism; and said upper edge having a curved surface extending inwardly wherein a degree of curvature of said curved surface is directly proportioned to a degree said tongue must be bent during opening of said latch mechanism thereby regulating the difficulty of opening said latch mechanism when said latch is in the hard to open position;

SUBSTITUTE SHEET

- (c) the second of the closure member or the container body having extending therefrom a bar; said bar being positioned such that, when said latch is in the hard to open configuration thereof, said tooth is resiliently biased over said bar and said mating surface is aligned to abut against said back surface in close proximity to said bar, such that a user, to open the latch mechanism, must manually bias the distal end of said latch to bend the latch at the upper edge of the mating surface such that said tooth clears said bar while simultaneously lifting said closure member.

SUBSTITUTE SHEET

5. In a latch mechanism for securing a closure member to a container body including a latch secured at one end thereof to a first of the closure member or the container body; said closure member and said container body being movable relative to each other between an open and a closed configuration, the improvement comprising wherein:

- (a) said latch comprises an elongate tongue having a rear surface and having a tooth extending outwardly opposite said rear surface from near a distal end thereof and further having a ridge extending outwardly opposite said rear surface across said tongue generally parallel to and in a spaced relation to said tooth; and

SUBSTITUTE SHEET

- (b) the second of the closure member or the container body having extending therefrom a bar; said bar being positioned such that, when said latch is in the closed configuration thereof, said bar is positioned between said tooth and said ridge such that a user, to open said latch mechanism, must manually bias the distal end of said latch to bend the latch rearwardly relative to said bar such that said tooth clears said bar while simultaneously lifting said closure member relative to said container body; said ridge inhibiting a user from opening the latch mechanism by simultaneously pushing inward on said tongue and upward on said latch mechanism such that the user must push on said tongue near said tooth while simultaneously lifting said closure member at a spaced location from said tooth requiring substantial manual dexterity.

SUBSTITUTE SHEET

6. In a latch mechanism for securing a closure member to a container body including a multipositional latch hinged to a first of the closure member or the container body and allowing a user to select between a hard to open configuration and an easy to open configuration, the improvement comprising wherein:

- (a) said latch is an elongate tongue hinged at one end thereof to the first of the closure member or the container body and having a rear surface and having a tooth extending outwardly opposite said rear surface from near a distal end thereof and further having an elongate channel extending from said rear surface to near an innermost edge of said tooth;
- (b) the first of the closure member or the container body also having positioned thereon a mating surface that abuts against said rear surface when said latch is in the hard to open configuration thereof; said mating surface having an upper edge whereabout said tongue is bent during opening of said latch mechanism; and

SUBSTITUTE SHEET

- (c) the second of the closure member or the container body having extending therefrom a bar; said bar having a bead projecting therefrom; said bar being positioned such that, when said closure member is closed relative to said container body and said latch is in the hard to open configuration thereof, said tooth is resiliently biased over said bar and said elongate channel interferingly mates with said projecting bead and said mating surface is aligned to abut against said back surface in close proximity to said bar, such that a user, to open said latch mechanism must manually bias the distal end of said latch to bend the latch at the upper edge of the mating surface such that said bead disengages from said channel and said tooth clears said bar while simultaneously lifting said closure member.

SUBSTITUTE SHEET

7. In a latch mechanism for securing a closure member to a container body including a multipositional latch hinged to a first of the closure member or the container body and allowing a user to select between a hard to open configuration and an easy to open configuration, the improvement comprising wherein:

- (a) said latch is an elongate tongue hinged at one end thereof to the first of the closure member or the container body and having a rear surface and further having a tooth extending outwardly opposite said rear surface from a near distal end thereof;
- (b) the first of the closure member or the container body also having positioned thereon a mating surface that abuts against said backing surface when said latch is in the hard to open configuration thereof; said mating surface having an upper edge whereabout said tongue is bent during opening of said latch mechanism;

- (c) the second of the closure member or the container body having extending therefrom a bar; said bar being positioned such that, when said latch is in the hard to open configuration thereof, said tooth is resiliently biased over said bar and said mating surface is aligned to abut against said back surface in close proximity to said bar, such that a user, to open the latch, must manually bias the distal end of said latch to bend the latch at the upper edge of the mating surface such that said tooth clears said bar while simultaneously lifting said closure member; and
- (d) first and second walls extending generally radially outward from the first of said closure member or container body; said first and second walls being positioned on either side of said tongue and in close proximity thereto when the closure member is in a closed position thereof and extending sufficiently outward so that the teeth of a child cannot readily be positioned between said first and second walls to effectively engage said tongue to enable the teeth to pry under said tongue and thereby force said latch mechanism open.

SUBSTITUTE SHEET

8. A latch mechanism according to Claim 7 including the container body and the closure member and wherein said container body includes:

- (a) a circumferential ridge extending about a mouth thereof; said ridge being positioned so as to extend over a bottom surface of said closure member when said closure member is in a closed position so as to inhibit a child from grasping said bottom surface to pry said closure member to an open position.

SUBSTITUTE SHEET

9. A latch mechanism for securing a closure member to a container body including:
- (a) a latch integrally connected to a first of the closure member or the container body;
 - (b) said latch is an elongate tongue attached at one end thereof to the first of the closure member or the container body and having a rear surface and further having a tooth extending outwardly opposite said rear surface from near a distal end thereof;
 - (c) the first of the closure member or the container body also having positioned thereon a mating surface that abuts against said rear surface during opening of said latch mechanism; said mating surface having an edge whereabout said tongue is bent during opening of said latch mechanism; and

SUBSTITUTE SHEET

- (d) the second of the closure member or the container body having extending therefrom a bar; said bar being positioned so that, when said latch mechanism is moved to a closed configuration thereof, said tooth is resiliently biased over said bar and said mating surface is aligned to abut against said back surface in close proximity to said bar, such that a user, to open said latch mechanism, must manually bias the distal end of said latch to bend the latch at the edge of the mating surface such that said tooth clears said bar while simultaneously lifting said closure member.

SUBSTITUTE SHEET

10. A hinge for a container having a container body and a closure member, said hinge including:
- (a) a pair of outwardly extending struts mounted on a first of said closure member or container body having a bar-like structure extending therebetween in spaced relation to the first of the closure member or container body so as to form an aperture therebetween;
 - (b) a wall depending from a second of the closure member or container body; said wall having a semi-circular sleeve attached thereto; said sleeve shaped to receive and rotate about said bar-like structure; said sleeve having a thickness being also sized to relatively snugly fit into said aperture, while being rotatable on said bar-like structure; and said sleeve being positioned such that when said closure member is in an open configuration thereof, said sleeve is easily removed from said bar-like structure and when said closure member is in the closed position thereof, said sleeve wraps around said bar-like structure and is positioned to interfere with removal thereof from said apparatus; and

- (c) an interference projection mounted on the first of said closure member or container body and extending outwardly relative to one of said struts so as to engage the second of said closure member or container body while said closure member is in an open position; said interference projection preventing said closure member swinging due to gravity from at least one open position to the closed position thereof and requiring a user to exert a small degree of force on a top of said closure member in order to place said closure member in the closed position thereof from said open position.

11. A hinge for a container having a container body and a closure member, said hinge including:

- (a) a pair of outwardly extending struts mounted on a first of said closure member or container body having a bar-like structure, polygonal in shape and having projections thereon; said bar-like structure extending therebetween and in spaced relation to the first of the closure member or container body so as to form an aperture therebetween; and

SUBSTITUTE SHEET

- (b) a wall depending from a second of said closure member or container body; said wall having a semi-circular sleeve attached thereto; said sleeve having an interior polygonal shaped surface so as to have a series of valleys; said projections being rotatable in said sleeve and each of said projections successively engaging said valleys upon relative rotation thereof; said sleeve shaped to receive said bar-like structure and hold said closure member in a fixed position at each location where said projections align with the valleys of the sleeve polygonal shaped surface; said sleeve being rotatable on said bar-like structure when a user exerts a small degree of force on said closure member; said sleeve having a thickness being also sized to relatively snugly fit into said aperture, while being rotatable on said bar-like structure; and said sleeve being positioned such that when said closure member is in an open configuration thereof, said sleeve is easily removed from said bar-like structure and when said closure member is in the closed position thereof, said sleeve wraps around said bar-like structure and is positioned to interfere with removal thereof from said aperture.

SUBSTITUTE SHEET

12. A hinge for a container having a container body and a closure member, said hinge including:

- (a) a pair of outwardly extending struts mounted on a first of said closure member or container body and having a bar-like structure extending therebetween in spaced relation to the first of the closure member or container body so as to form an aperture therebetween;
- (b) a first wall depending from a second of the closure member or container body; said first wall having a semi-circular sleeve attached thereto; said sleeve shaped to receive and rotate about said bar-like structure; said sleeve having a thickness being also sized to relatively snugly fit into said aperture, while being rotatable on said bar-like structure; and said sleeve being positioned such that when said closure member is in an open configuration thereof, said sleeve is easily removed from said bar-like structure and when said closure member is in the closed position thereof, said sleeve wraps around said bar-like structure and is positioned to interfere with removal thereof from said aperture; and

SUBSTITUTE SHEET

- (c) second and third walls extending generally radially outward from the first of said closure member or container body; said second and third walls being generally vertically aligned when said closure member is in the closed position thereof and horizontally aligned; said first and second walls positioned on either side of said bar-like structure and in close proximity to said sleeve when the closure member is in the closed position thereof so that the teeth of a child cannot readily be positioned between said second and third walls and said sleeve at such an angle to enable the teeth to pry said sleeve; said second and third walls projecting above said bar-like structure so that the teeth of a child cannot readily be positioned between said sleeve and the first of said closure member or container body.

SUBSTITUTE SHEET

13. A hinge for a container as set forth in Claim 12

wherein the container body includes:

- (a) an outer circumferential ridge extending above the bottom surface of said closure member when said closure member is in the closed position so as to help prevent a child from grasping or biting said bottom surface to pry said closure member open.

SUBSTITUTE SHEET

1-6

Fig. 1.

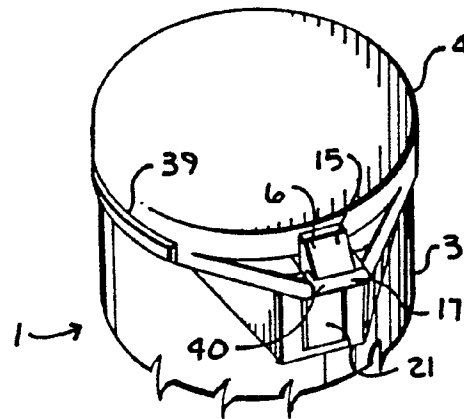
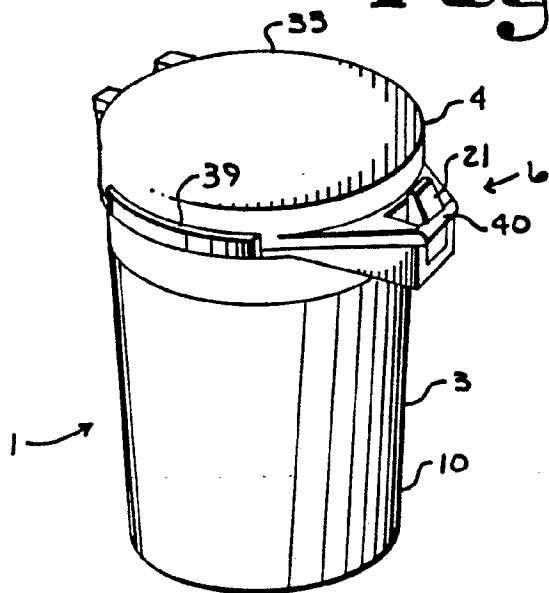


Fig. 2.

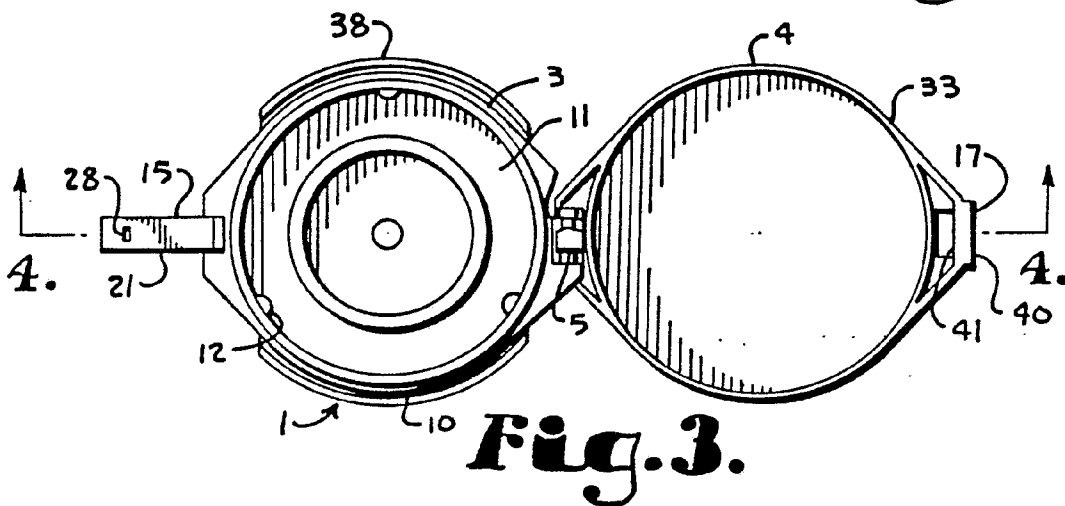


Fig. 3.

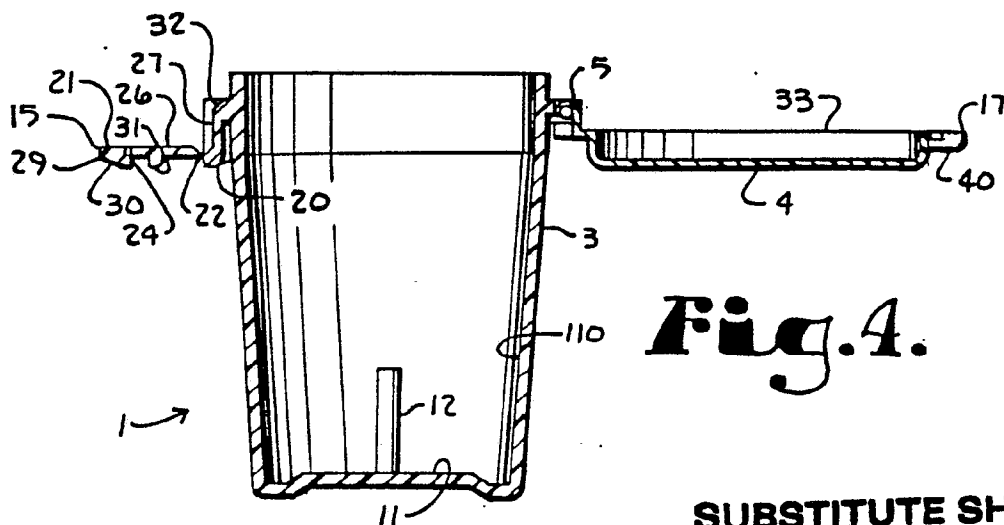


Fig. 4.

SUBSTITUTE SHEET

2-6

Fig. 5.

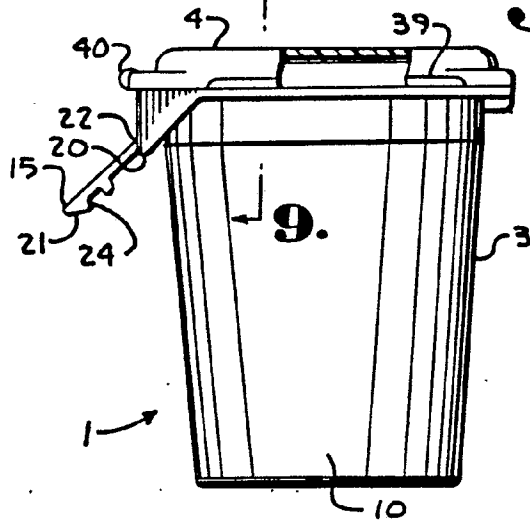


Fig. 6.

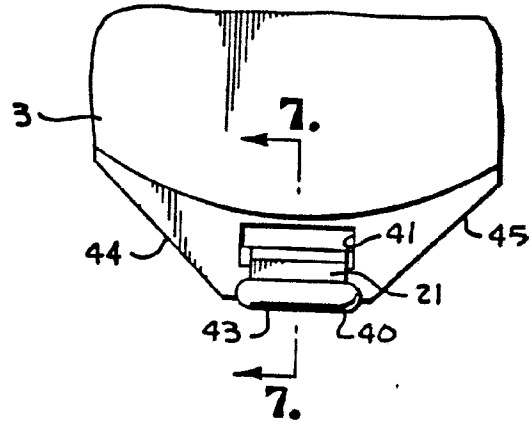


Fig. 7.

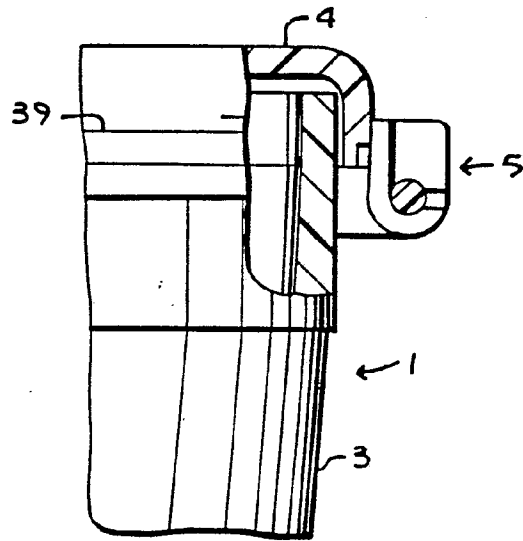
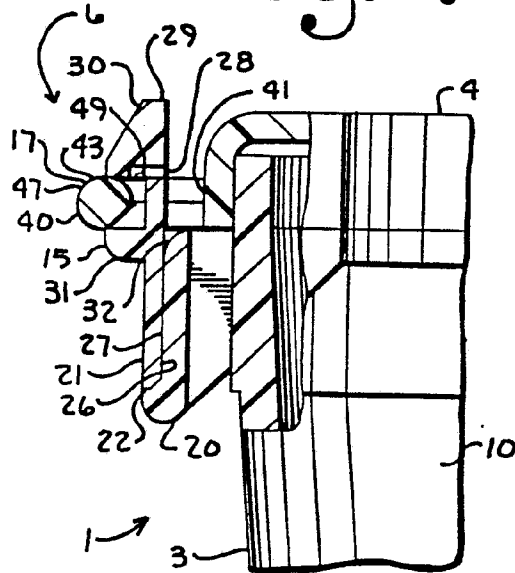
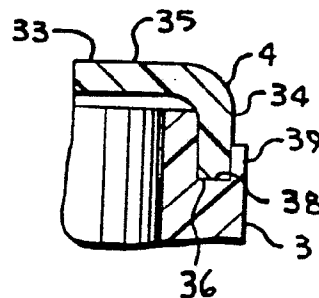


Fig. 8.

Fig. 9.



SUBSTITUTE SHEET

3-6

Fig. 10.

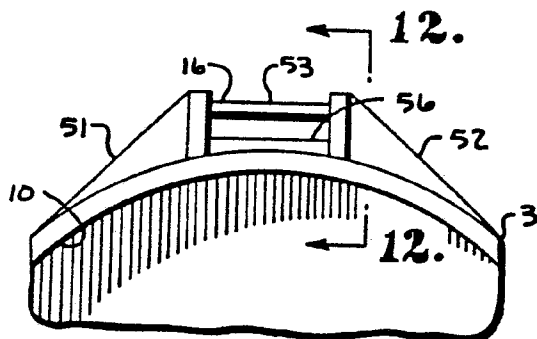


Fig. 11.

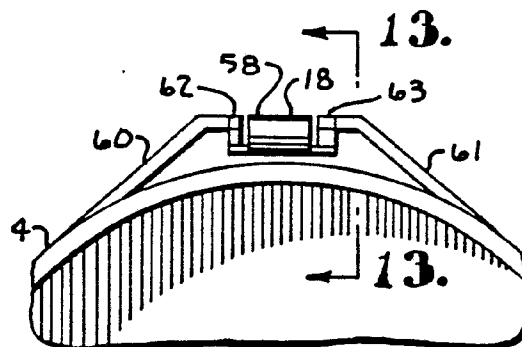


Fig. 12.

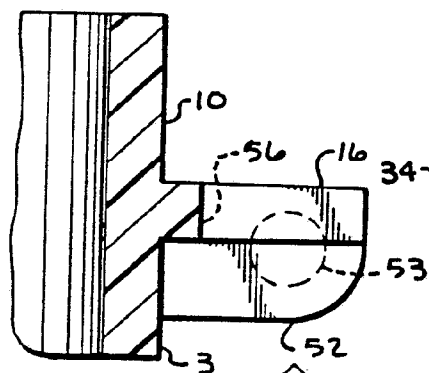


Fig. 13.

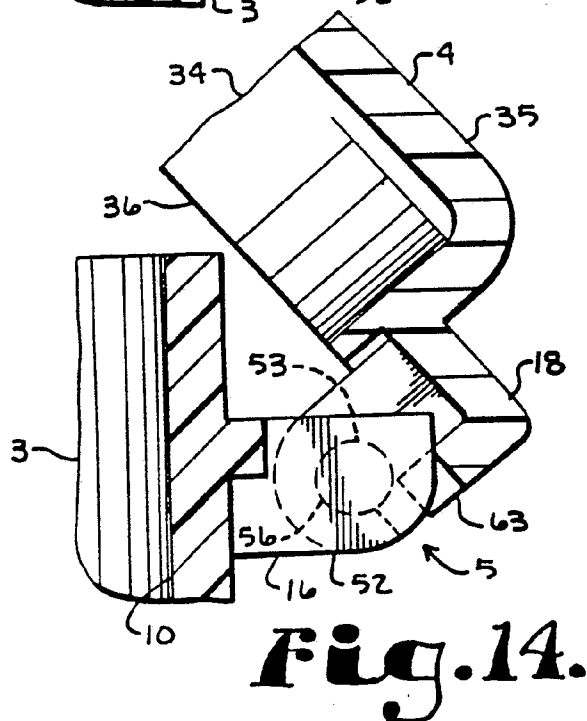
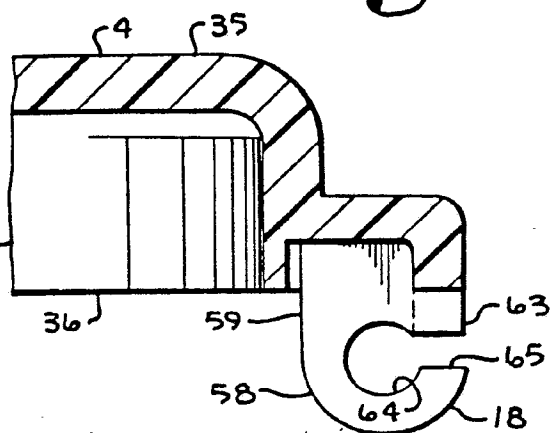
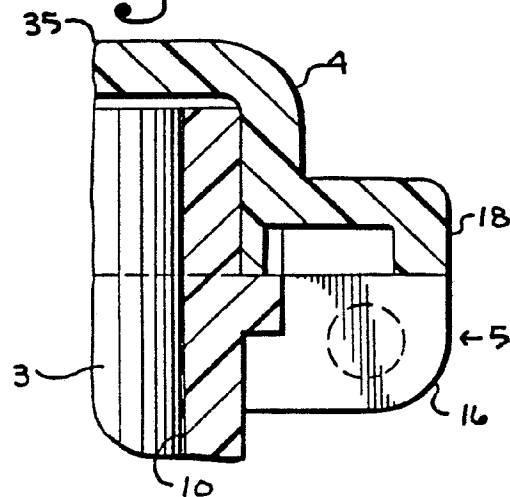


Fig. 15.



SUBSTITUTE SHEET

4-6

Fig. 16.

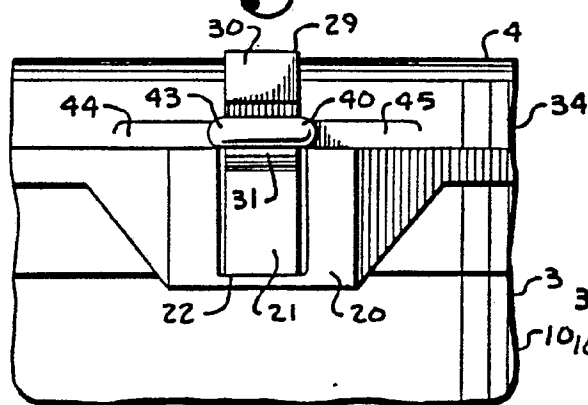


Fig. 17.

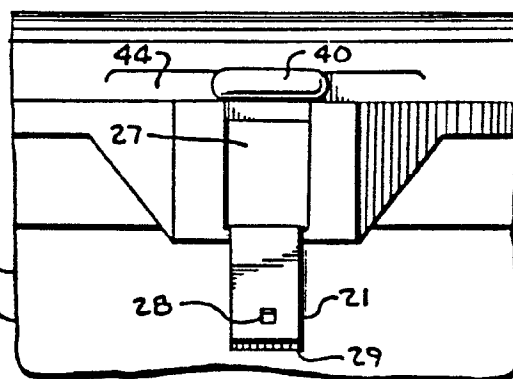


Fig. 18.

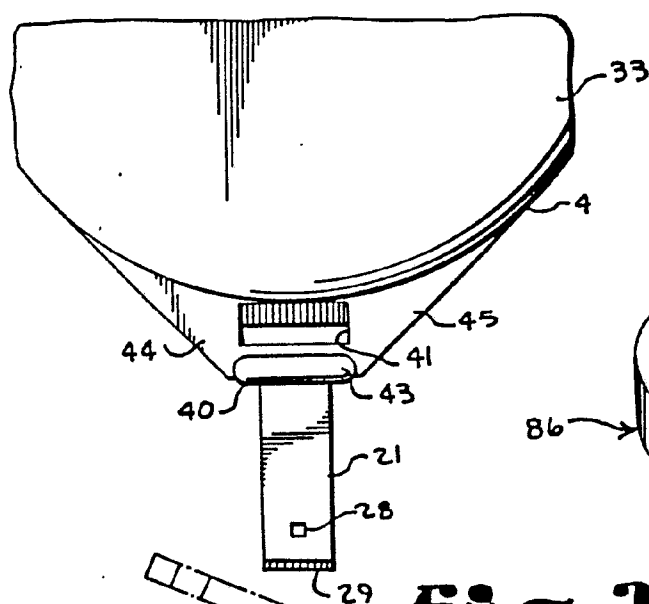


Fig. 25.

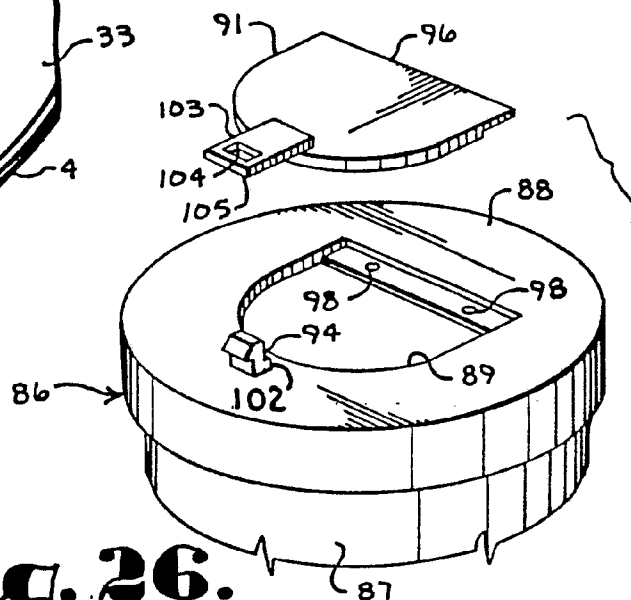


Fig. 26.

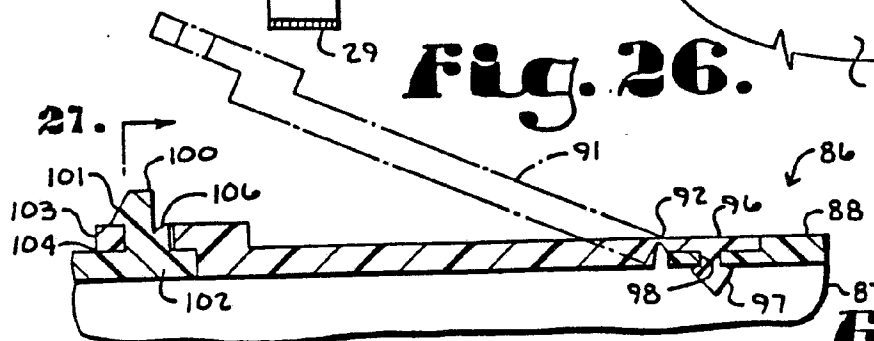


Fig. 27.

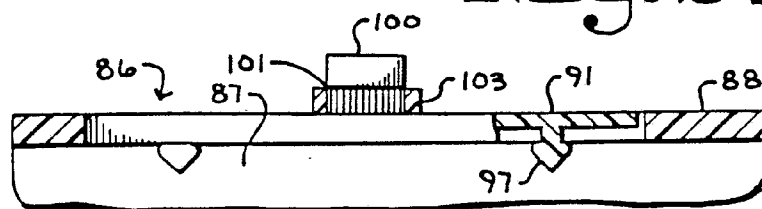


Fig. 19.

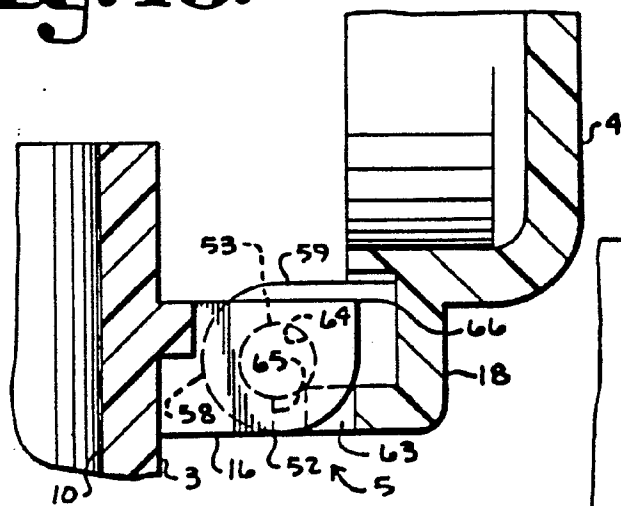


Fig. 20.

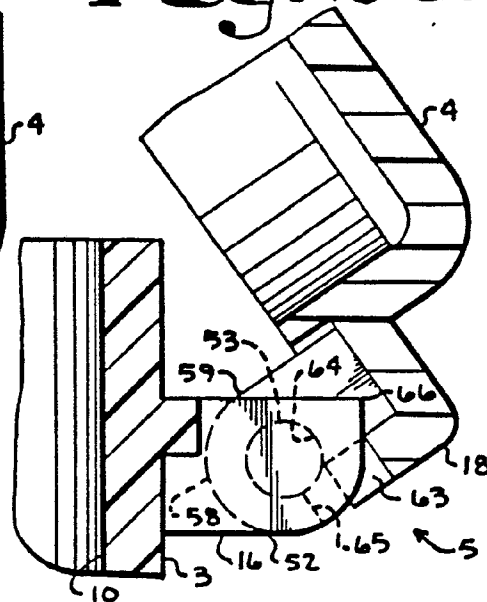


Fig. 21.

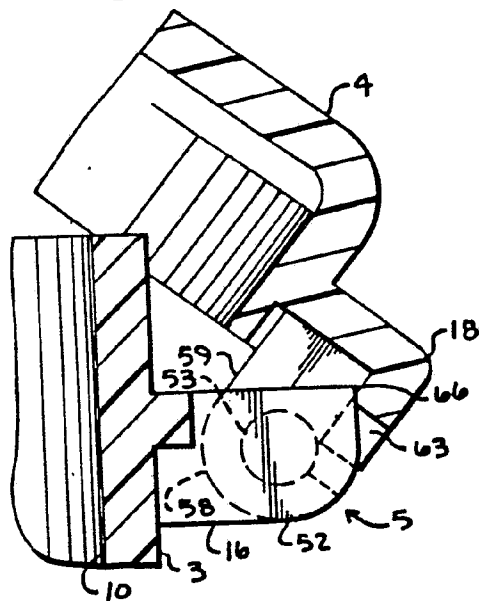


Fig. 22.

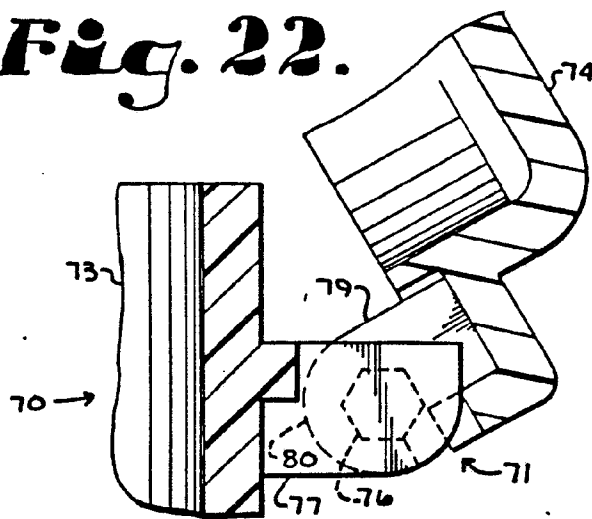


Fig. 23.

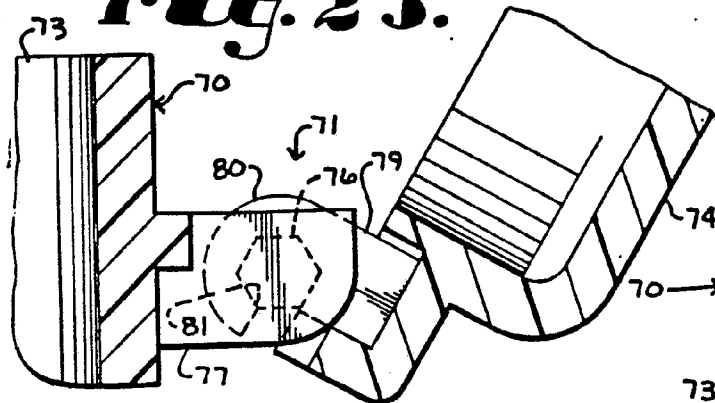
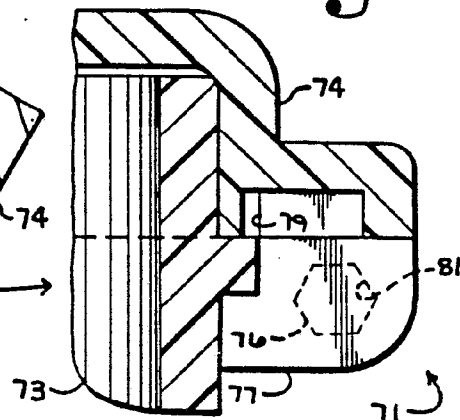


Fig. 24.



6-6

Fig. 28.

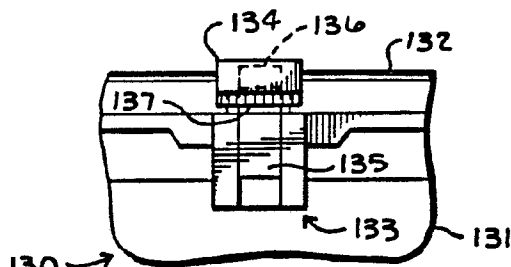
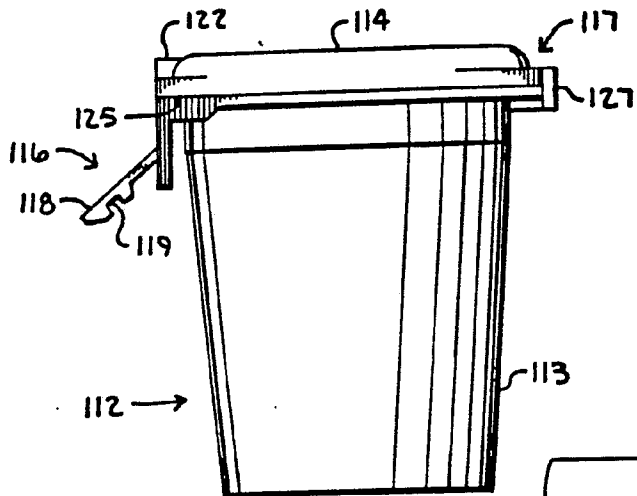


Fig. 31.

Fig. 30.

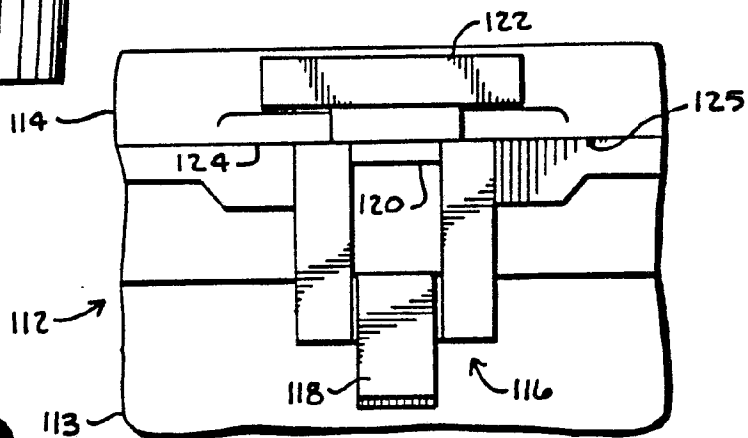


Fig. 29.

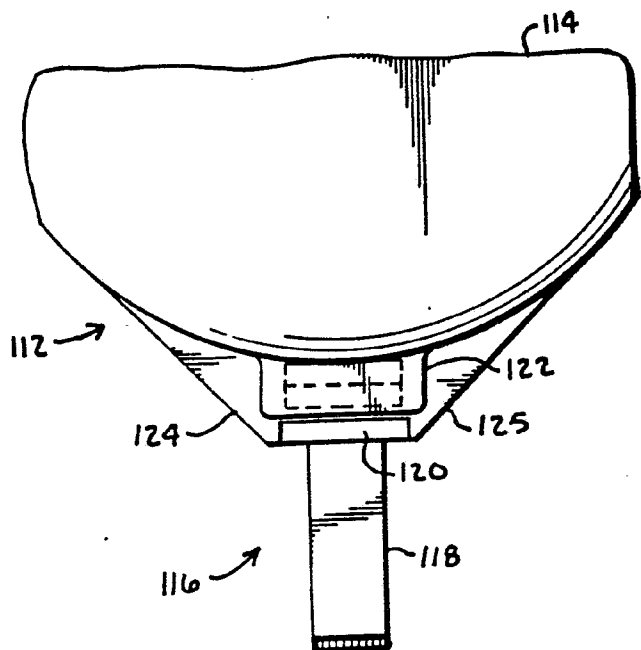
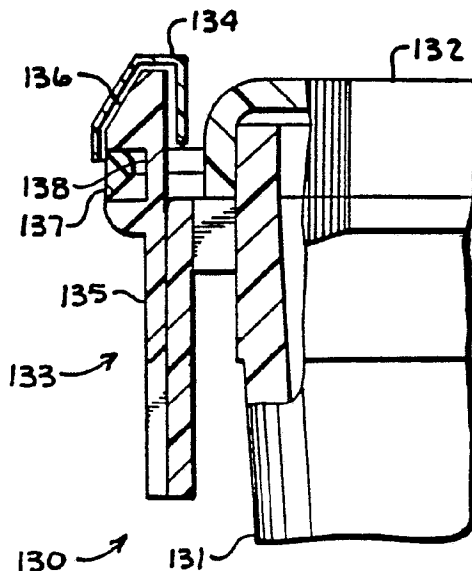


Fig. 32.



INTERNATIONAL SEARCH REPORT

International Application No. PCT/US89/00756

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC <div style="text-align: center; font-family: monospace; font-size: 1.2em;">IPC(4)B65D 43/14, 51/04, 55/02</div>																				
II. FIELDS SEARCHED <div style="text-align: right; font-size: 0.8em;">Minimum Documentation Searched ⁷</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding: 5px;">Classification System</td> <td style="padding: 5px;">Classification Symbols</td> </tr> <tr> <td style="text-align: center; vertical-align: middle; padding: 10px;">US</td> <td style="padding: 10px;">215/216.235,237,224,316; 220/337,338</td> </tr> </table> <div style="text-align: center; font-size: 0.8em; margin-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸</div>			Classification System	Classification Symbols	US	215/216.235,237,224,316; 220/337,338														
Classification System	Classification Symbols																			
US	215/216.235,237,224,316; 220/337,338																			
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; padding: 5px;">Category [*]</th> <th style="width: 70%; padding: 5px;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 20%; padding: 5px;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A 2,797,840 (Gibbs) 2 July 1957</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A 3,023,923 (Geib et al) 6 March 1962</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A 4,424,910 (Heinol) 10 Jan. 1984</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A 4,632,266 (Osswald) 30 Dec. 1986</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A 4,687,112(Swartzbaur'gh) 18 August 1987</td> <td></td> </tr> </table>			Category [*]	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	A	US, A 2,797,840 (Gibbs) 2 July 1957		A	US, A 3,023,923 (Geib et al) 6 March 1962		A	US, A 4,424,910 (Heinol) 10 Jan. 1984		A	US, A 4,632,266 (Osswald) 30 Dec. 1986		A	US, A 4,687,112(Swartzbaur'gh) 18 August 1987	
Category [*]	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³																		
A	US, A 2,797,840 (Gibbs) 2 July 1957																			
A	US, A 3,023,923 (Geib et al) 6 March 1962																			
A	US, A 4,424,910 (Heinol) 10 Jan. 1984																			
A	US, A 4,632,266 (Osswald) 30 Dec. 1986																			
A	US, A 4,687,112(Swartzbaur'gh) 18 August 1987																			
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>[*] Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>																				
IV. CERTIFICATION <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> Date of the Actual Completion of the International Search <div style="text-align: center; font-family: monospace; font-size: 1.2em;">20 May 1989</div> </td> <td style="width: 50%; padding: 5px;"> Date of Mailing of this International Search Report <div style="text-align: center; font-family: monospace; font-size: 1.5em;">05 JUL 1989</div> </td> </tr> <tr> <td style="padding: 5px;"> International Searching Authority <div style="text-align: center; font-family: monospace; font-size: 1.2em;">ISA/US</div> </td> <td style="padding: 5px;"> Signature of Authorized Officer <div style="text-align: center;">J. Moy </div> </td> </tr> </table>			Date of the Actual Completion of the International Search <div style="text-align: center; font-family: monospace; font-size: 1.2em;">20 May 1989</div>	Date of Mailing of this International Search Report <div style="text-align: center; font-family: monospace; font-size: 1.5em;">05 JUL 1989</div>	International Searching Authority <div style="text-align: center; font-family: monospace; font-size: 1.2em;">ISA/US</div>	Signature of Authorized Officer <div style="text-align: center;">J. Moy </div>														
Date of the Actual Completion of the International Search <div style="text-align: center; font-family: monospace; font-size: 1.2em;">20 May 1989</div>	Date of Mailing of this International Search Report <div style="text-align: center; font-family: monospace; font-size: 1.5em;">05 JUL 1989</div>																			
International Searching Authority <div style="text-align: center; font-family: monospace; font-size: 1.2em;">ISA/US</div>	Signature of Authorized Officer <div style="text-align: center;">J. Moy </div>																			